

09/608874

POM-12302/29
03006sh

Abstract of the Disclosure

In a direct-metal deposition (DMD) process used to deposit successive layers in accordance with instructions from a CAD/CAM program, the laser beam, or an additional beam, is deployed as a localized heat treatment tool instead of a deposition tool. The use of
5 laser energy during the process can minimize, if not eliminate, the periodic heat treatments now required for stress alleviation, thereby compressing the DMD fabrication cycle. In the preferred embodiment, every deposition run may be followed by a dry (i.e., without powder) run of one or more intensities to manipulate the stress magnitude and location. Since it is well known that residual stress is a function of cooling rate, a plurality of laser beams may
10 alternatively be used to control the cooling rate of the deposited layer. Examples of stress reduction using H13 tool steel are provided.